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Let $OQ=q$, $\sin\theta=\dfrac{q}{\sqrt{(q^2+b^2)}}$, $\sin\phi=\dfrac{q}{m\sqrt{(q^2+b^2)}}$;

$$QP=QR=\frac{a}{b}.\ BQ=\frac{a}{b}\sqrt{(q^2+b^2)};\ x=q+\frac{aq}{bm};\ y=QP\cos\phi$$

$$=a\sqrt{1+\frac{(m^2-1)x^2}{(a+bm)^2}};\ i.\ e.,\ \frac{y^2}{a^2}-\frac{x^2}{\dfrac{(a+bm)^2}{m^2-1}}=1,$$

hyperbola, center at O, AB principal axis.

An excellent solution was also received from H. C. Feemster.
This problem properly belongs to the Miscellaneous Department.

322. Proposed by E. B. ESCOTT, University of Michigan.

Find the equation of the curve such that the solid of revolution generated by revolving it about the x-axis shall have a volume equal to the m/nth part of the volume of the circumscribed cylinder.

Solution by H. PRIME, Boston, Massachusetts, and J. SCHEFFER, A. M., Hagerstown, Maryland.

Let $\pi\int y^2dx=\pi\,(m/n)y^2x$.

Differentiating and arranging, $2m\,dy/y=(n-m)\,dx/x$.

Hence by integrating, $2m\log y=(n-m)\log x+\log c$.

$\log y^{2m}=\log x^{n-m}+\log c$, $y^{2m}=a^mx^{n-m}$ and $y^2=ax^{n/m-1}$.

This is the equation of the family of parabolas, including the case when $m/n=1/3$ and $y^2=ax^2$. Thus we have the familiar relation of the cone and its circumscribing cylinder.

Also solved similarly by M. A. Muzzy, and Elijah Swift.

323. Proposed by C. N. SCHMALL, New York City.

From what height must an elastic ball be dropped in order that, after impact with the hard surface of the sidewalk, it may rebound to a given altitude a in the least possible time from the moment of descent?

Solution by J. SCHEFFER, A. M., Hagerstown, Maryland.

Let x be the height. Then will the velocity at the moment the ball strikes the surface$=\sqrt{(2gx)}$, and the time, t_1, $=\sqrt{(2x/g)}$. It rebounds now with a velocity$=e\sqrt{(2gx)}$, e being the coefficient of elasticity. Denoting the time it reaches the height a by t_2, we have $a=e\sqrt{(2gx)}.t_2-(gt_2^2/2)$, whence $t_2=\sqrt{(2/g)}]e\sqrt{x}\pm\sqrt{(e^2x-a)}]$. Consequently the total time is